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ABSTRACT

The concepts and methods of human ecology are applied to the geographic distribution of members of the American Educational Research Association. State characteristics are measured by five factors: (1) large-scale agriculture; (2) population size; (3) affluence-urbanization; (4) white predominance; (5) emphasis on specialized agriculture. City characteristics are based on population, affluence, residential mobility, white predominance, and emphasis on higher education. Population size is the strongest correlate of the absolute number of educational researchers in the various states. When number of researchers relative to population is considered, educational researchers are concentrated in affluent, urban states. In the city data, the tendency is for educational researchers to be concentrated in university towns. This pattern of results supports the convergent and discriminant validity of the ecological approach in that it resembles the pattern found for psychologists, psychiatrists, and social workers more than the pattern for veterinarians. (Author/MH)

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Report No. 261
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THE HUMAN ECOLOGY OF THE AMERICAN EDUCATIONAL RESEARCH ASSOCIATION

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Introductory Statement

The Center for Social Organization of Schools has two primary objectives: to develop a scientific knowledge of how schools affect their students, and to use this knowledge to develop better school practices and organization.

The Center works through four programs to achieve its objectives. The Policy Studies in School Desegregation program applies the basic theories of social organization of schools to study the internal conditions of desegregated schools, the feasibility of alternative desegregation policies, and the interrelation of school desegregation with other equity issues such as housing and job desegregation. The School Organization program is currently concerned with authority-control structures, task structures, reward systems, and peer group processes in schools. It has produced a large-scale study of the effects of open schools, has developed Student Team Learning Instructional processes for teaching various subjects in elementary and secondary schools, and has produced a computerized system for school-wide attendance monitoring. The School Process and Career Development program is studying transitions from high school to post secondary institutions and the role of schooling in the development of career plans and the actualization of labor market outcomes. The Studies in Delinquency and School Environments program is examining the interaction of school environments, school experiences, and individual characteristics in relation to in-school and later-life delinquency.

This report, prepared by the School Organization Program, examines the utility of applying a human ecological approach to the study of the geographic distributions of populations.

The Human Ecology of the American Educational Research Association

Abstract

Characteristics of cities and states were correlated with measures of the geographic distribution of educational researchers in the United States. As would be expected, population size is the strongest correlate of the absolute number of educational researchers in the various states. When number relative to population is considered, educational researchers are concentrated in affluent, urban states. The most striking trend in the city data is the tendency for educational researchers to be concentrated in university towns. This pattern of results supports the convergent and discriminant validity of the ecological approach in that it resembles the pattern for psychologists, psychiatrists, and social workers more than the pattern for veterinarians.

The Human Ecology of the American Educational Research Association

Human ecology usually is defined as the study of the relationships between human populations and their environments, so its typical units of analysis are spatially delimited populations (Bailay & Mulcahy, 1972; Duncan & Schnore, 1959; Hawley, 1950). It differs from other perspectives in the behavioral sciences in placing emphasis on studying population aggregates as organized wholes which can be characterized by their patterns of activities. Although human ecology has been especially influential in sociology, Michaels (1974) has presented a persuasive integration of human ecology with approaches that apply the principles of operant conditioning to the analysis of complex social behavior. Consequently, human ecology appears to be a useful perspective not only for sociology but also for psychology.

Human ecology frequently has been applied to the analysis of the geographic distribution of the members of various professions (Marden, 1960; Reskin & Campbell, 1974; Richards, 1977; Richards & Gottfredson, 1978). These studies have emphasized the health professions, however, and it would be useful, both theoretically and practically, to study other kinds of professionals. Consequently, this study applies the concepts and methods of human ecology to the geographic distribution in the United States of members of the American Educational Research Association.

Method

A general paradigm has evolved for ecological investigations of the geographic distribution of professionals. This paradigm involves measuring the characteristics of some convenient units of analysis, such as states,

cities, or Standard Metropolitan Statistical Areas (SMSAs) and correlating these characteristics with measures of the distribution of the professional group in question among the same units. Two units of analysis were used in the present study. The first consisted of the 51 states, treating the District of Columbia as a state. The second consisted of the 916 U.S. cities and unincorporated places that had populations of 25,000 or more in the 1970 census (U.S. Bureau of the Census, 1973).

State characteristics were measured by scores on the five orthogonal factors obtained in an earlier investigation (Richards, 1977). These five factors are identified and described briefly below:

Emphasis on Large-Scale Agriculture. High-scoring states have large land areas, much of their land in farms, and relatively high incomes per farm from field crops and livestock.

Population Size. High scoring states had relatively many inhabitants at the 1970 census. They also had large numbers of institutions providing education in the health fields and relatively low male-female ratios. The chosen title is Population Size rather than just Size because land area did not load on this factor.

Affluence-Urbanization. The high scoring state has a high median family income and a large proportion of its population living in cities.

White Predominance. The major characteristic of the high-scoring state is that a large proportion of its population is white.

Emphasis on Specialized Agriculture. High scoring states have relatively high incomes from dairy, poultry, and truck farming. They also have high incomes relative to their labor force from manufacturing.

The three non-agricultural factors are similar to factors obtained in studies of cities, counties, and SMSAs (Bonjean, 1971). Size and affluence factors also were obtained in studies using nations (Sawyer, 1967) and colleges and universities (Astin, 1962; Richards, 1973) as the units of analysis. The two agricultural factors tap human activities on which states vary widely and which are critically important to the future of humanity (Hutchinson, 1969).

The measures of city characteristics were chosen on the basis of Bonjean's (1971) integration of several factor-analytic studies. It was not feasible to compute factor scores, however, so each city characteristic was estimated by a single index taken from standard reference sources (U.S. Bureau of the Census, 1973; U.S. Office of Education, 1972). Population Size was estimated by number of inhabitants enumerated in the 1970 census. Affluence was estimated by median family income. Residential Mobility was estimated by the percentage of households who moved into their housing units during the 5 years preceding the 1970 census. White Predominance was estimated by the percentage of the 1970 population classified as white. Finally, Emphasis on Higher Education was estimated by dividing the number of students enrolled in colleges and universities in each city by the total population of that city.

The 1974-75 AERA membership directory (American Educational Research Association, 1974) provided the data about the geographic distribution of educational researchers. The two measures of geographic distribution used in this study were the total number and the number relative to population (as enumerated in the 1970 census) of educational researchers in each

state and city. Such directory data has yielded useful results in studies of health professionals (Richards, 1977; Richards & Gottfredson, 1978) and ecological correlations based on such data appear quite stable over periods of several years (Richards & Gottfredson, 1978). On the other hand, it is not known how representative AERA members are of all persons whose work might be considered educational research. Therefore, this study probably should be interpreted as roughly representative of persons whose professional self-identification is educational researcher.

The geographic distribution (among states only) of a comparison group also was analyzed. This comparison group consisted of members of the Division of Educational Psychology (Division 15) of the American Psychological Association. This group has obvious similarities to the AERA group, and also serves to tie this study to an earlier study of U.S. psychologists (Richards & Gottfredson, 1978). Moreover, the data were obtained from an APA membership directory (American Psychological Association, 1973), so they should be comparable in both quality and possible limitations to the AERA data.

The design of this study is correlational, and a number of variables were highly skewed or had other undesirable properties for a correlational analysis. Therefore, the variables were transformed to normalized standard scores (Angoff, 1971). That is, scores within each distribution were converted to percentile ranks and normal variates corresponding to these ranks were taken from the table of the normal curve. (The state factor scores, however, were computed from normalized variables but were not themselves normalized.) Such normalizing transformations are relatively

common in geographical investigations like this one (e.g., Harris, 1976; Meyer, 1972). The main properties of distributions that are invariant under this transformation are ordinal relationships, so the main effect of the transformation in the present study was to reduce the impact of "outliers" on the correlations.

Results

Table 1 summarizes the zero-order and multiple correlations between state characteristics and the measures of the geographic distribution of educational researchers. These and other correlations computed in this study appear to be population values (although they are subject to an unknown magnitude of measurement error), so tests of significance were not applied. State characteristics were measured by scores on orthogonally rotated factors for the same units of analysis used in performing the factor analysis, so the zero-order correlations are equal within rounding error to the beta weights. Because a normalizing transformation was used, the appropriate measures of raw score central tendency and dispersion appeared to be, respectively, the median and the semi-interquartile range.

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Insert Table 1 About Here

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The ecological variables account for about 90% of the variance among states in number of AERA members and approximately 40% of the variance in numbers relative to population. The multiple correlations for total number are comparable to those obtained in previous studies (Richards, 1977; Richards & Gottfredson, 1978), but the correlations for relative number are somewhat lower than those obtained previously. Population size, of

course, is the major correlate of the absolute number of educational researchers. When number relative to population is considered, educational researchers are concentrated in affluent, urban states with large populations. Educational psychologists are distributed in a generally similar way, but are somewhat more concentrated in affluent, urban states.

Table 2 summarizes the relationship of city characteristics to the distribution of AERA members. The measures of city characteristics, unlike the measures of state characteristics, are not completely independent. For this reason, Beta weights, or, more exactly, standardized partial regression coefficients, are shown in Table 2. Measures of virtually all of the known city characteristics are included, so it appears meaningful to interpret these coefficients as the correlations between given city characteristics and the distribution of educational researchers when other city characteristics are held constant.

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Insert Table 2 About Here

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Both the zero-order and the multiple correlations for cities are somewhat lower than the state correlations, a result to be expected from the lower level of aggregation involved in the city correlations (Robinson, 1950). The most striking trend in the city data is the extent to which AERA members are concentrated in university towns. Although one would expect some correlation, the magnitude of this relationship is somewhat surprising. Population size, of course, again is substantially correlated with the absolute number of educational researchers. The standardized partial regression coefficients indicate that if other city

characteristics are held constant, AERA members tend to be concentrated in realtively wealthy cities.

Discussion

This study provides further construct validation of the human ecological approach. The characteristics of states and cities are correlated substantially and meaningfully with measures of the geographic distribution of educational researchers. Moreover, the pattern of results strongly resembles the pattern of results for psychologists, psychiatrists, and social workers (Richards & Gottfredson, 1978), but differs from the pattern for veterinarians (Richards, 1977), especially large animal veterinarians. That is, the pattern for educational researchers resembles the pattern for other human-oriented professions more than the pattern for an animal-oriented profession. Thus, the results provide both convergent and discriminant evidence for the validity of human ecological concepts and methods.

At the same time, these correlations must be interpreted with caution, for such aggregate correlations cannot be interpreted as applying to individuals (Robinson, 1950). For example, the fact that educational researchers are relatively concentrated in affluent states does not necessarily mean that these researchers chose those states <u>because</u> the states are relatively rich. It is becoming increasingly clear that this characteristic of ecological characteristics is a very general problem for investigations of geographical distribution (Richards, 1977; Richards & Gottfredson, 1978), and that it would be very useful to conduct studies that relate variation in individual reasons for choice of location to variation in ecological characteristics. One way to attack this problem would be to survey the

members of some professional group, such as AERA, to obtain their own reports of their reasons for choice of location. Then it would be possible to correlate ecological characteristics with the average importance attached to various reasons for choice of location by those professionals who chose various locations.

If this study is viewed in terms of its implications for AERA, the most important finding clearly is the extent to which AERA members are concentrated in university towns. Such a pattern could come about in (at least) two different ways. First, it might be that most persons conducting educational research are indeed concentrated on university faculties and therefore in university towns. Second, it might be that AERA represents the interests of those persons conducting educational research who are on university faculties, but not those working for school districts, state agencies, research firms, and the like. It would seem useful to find out how many people's actual work involves educational research, what proportion of them are members of AERA, and what differences if any, exist between members and non-members. Such issues are especially important in view of current trends which make it unlikely that many newly graduated educational researchers will be able to obtain positions on university faculties.

Finally, an important characteristic of the present study is that it investigates the human ecology of geographic distribution in a context other than health care. Other possible studies from the context of education offer considerable promise for evaluating some of the theoretical propositions of human ecology. For example, such theoretical predictions about geographic distribution really apply more to institutions for meeting

specific human needs than to individuals, and the distribution of individuals sometimes has been used explicitly as a surrogate measure for the distribution of institutions (e.g., Reskin & Campbell, 1974). Obviously studies that actually investigated the distribution of institutions would provide more appropriate tests of human ecological theory. Therefore, it might be fruitful to conduct such educational studies as correlating the ecological characteristics of states with the average characteristics of colleges and universities located in the various states.

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Zero-Order and Multiple Correlations Between State Characteristics and Measures of the Distribution of Educational Researchers

	Members of:		Members Per 100,000 Population of:	
	AERA	APA Division 15	AERA	APA Division 15
Emphasis on Large Scale Agriculture	-.09	-.09	-.16	-.17
Population Size	.87	.84	.36	.24
Affluence-Urbanization	.24	.27	.49	.61
White Predominance	-.11	-.10	.02	-.03
Emphasis on Specialized Agriculture	.19	.29	.02	.06
R	.93	.94	.63	.68
Median	116.0	32.3	4.5	1.4
Semi-Interquartile Range	130.4	28.9	1.8	0.5

Table 2

Correlations, Beta Weights, and Multiple Correlations Between City Characteristics and Measures of the Distribution of Educational Researchers

	AERA Members		AERA Members Per 100,000 Population	
Population Size	.49	.39	.18	.07
Affluence	.08	.30	.15	.34
White Predominance	.17	.06	.17	.07
Residential Mobility	-.18	-.13	-.06	-.10
Emphasis on Higher Education	.52	.47	.53	.56
R	.70		.61	
Median	1.4		2.8	
Semi-Interquartile Range	2.3		3.7	